We claim:

Sub A2

1. A method for forming a liquid coating on a substrate comprising electrostatically spraying drops of the liquid onto a liquid-wetted conductive transfer surface, and transferring a portion of the thus-applied liquid from the transfer surface to the substrate to form a wet coating.

2. A method according to claim 1 wherein the transfer surface circulates.

Sub B7

3. A method according to claim 2 wherein the transfer surface comprises a drum.

4. A method according to claim 3 wherein the drum is grounded.

5. A method according to claim 2 wherein the transfer surface comprises a belt.

6. A method according to claim 1 wherein one or more nip rolls force the substrate against the transfer surface, thereby spreading the applied drops on the transfer surface and decreasing the time required for the drops to coalesce into the coating.

7. A method according to claim 6 wherein the nip roll causes the coating to have visually improved uniformity.

8. A method according to claim 1 wherein the wet coating is contacted by two or more pick-and-place devices that improve the uniformity of the coating.

9. A method according to claim 8 wherein at least one of the pick-and-place devices comprises a roll.

10. A method according to claim 9 comprising three or more pick-and-place rolls.

11. A method according to claim 10 wherein three or more of the rolls have different diameters.

12. A method according to claim 11 wherein at least one of the rolls is undriven.

13. A method according to claim 11 wherein all of the rolls are undriven.

14. A method according to claim 1 wherein the transfer surface comprises a rotating endless belt contacted by two or more pick-and-place devices that improve the uniformity of the coating.

15. A method according to claim 1 wherein the substrate comprises an insulative substrate.

16. A method according to claim 15 wherein the substrate is coated without pre-charging the substrate.

17. A method according to claim 1 wherein the substrate comprises paper, plastic, rubber, glass, ceramic, metal, biologically derived material, or a combination or composite thereof.

18. A method according to claim 17 wherein the substrate comprises a polyolefin, polyimide or polyester.

19. A method according to claim 1 wherein the wet coating is transferred from the conductive transfer surface to a second transfer surface and thence to the substrate.

20. A method according to claim 1 wherein the substrate comprises a porous substrate.

21. A method according to claim 1 wherein the substrate comprises a woven or nonwoven web.

22. A method according to claim 1 wherein the substrate is coated without substantial penetration of the coating through the substrate.

23. A method according to claim 1 wherein the substrate comprises an electronic film, component or precursor thereof.

24. A method according to claim 1 wherein the wet coating is dried, cured or otherwise hardened and has a final caliper.

25. A method according to claim 1 wherein the drops have an average diameter that is greater than the caliper and the coating is substantially void-free.

26. A method according to claim 1 wherein the caliper is less than about 10 micrometers.

27. A method according to claim 1 wherein the caliper is less than about 1 micrometer.

28. A method according to claim 1 wherein the caliper is less than about 0.1 micrometer.

29. A method according to claim 1 wherein the caliper is greater than about 10 micrometers.

30. A method according to claim 1 wherein the caliper is greater than about 100 micrometers.

31. A method according to claim 1 wherein the drops are neutralized on the transfer surface before being transferred to the substrate.

32. A method according to claim 1 wherein the coating is applied in one or more stripes that wholly or partially overlap, that abut one another, or that are separated by uncoated substrate.

33. An apparatus comprising a conductive transfer surface that when wet with a coating composition can transfer a portion of the coating to a substrate, and an electrostatic spray head for applying the coating composition to the conductive transfer surface.

34. An apparatus according to claim 33 wherein the transfer surface circulates.

35. An apparatus according to claim 34 wherein the transfer surface comprises a drum.

36. An apparatus according to claim 34 wherein the transfer surface comprises a belt.

37. An apparatus according to claim 33 wherein the transfer surface is grounded.

38. An apparatus according to claim 33 wherein the electrostatic spray head, or a series of electrostatic spray heads ganged together in a suitable array, produces a line of charged droplets.

39. An apparatus according to claim 33 wherein a plurality of electrostatic spray heads apply one or more coating compositions to the conductive transfer surface in one or more lanes.

40. An apparatus according to claim 39 wherein the spray heads apply a plurality of coating compositions to one lane.

41. An apparatus according to claim 39 wherein the spray heads apply coating compositions to a plurality of lanes.

42. An apparatus according to claim 33 comprising a plurality of circulating conductive transfer surfaces.

43. An apparatus according to claim 33 further comprising one or more nip rolls that force the substrate against the conductive transfer surface.

44. An apparatus according to claim 33 further comprising two or more pick-and-place devices that can periodically contact and re-contact the wet coating at different positions on the substrate, wherein the periods of the devices are selected so that the uniformity of the coating on the substrate is improved.

45. An apparatus according to claim 44 wherein at least one of the pick-and-place devices comprises a roll.

46. An apparatus according to claim 45 comprising three or more pick-and-place rolls.

47. An apparatus according to claim 46 wherein three or more of the rolls have different diameters.

48. An apparatus according to claim 46 wherein at least one of the rolls is undriven.

49. An apparatus according to claim 46 wherein all of the rolls are undriven.

50. An apparatus according to claim 46 wherein the substrate comprises a rotating endless belt or moving web, and the rolls rotate with the belt or web.

51. An apparatus according to claim 33 wherein the substrate comprises an insulative substrate.

52. An apparatus according to claim 51 wherein the substrate comprises plastic.

53. An apparatus according to claim 33 wherein the coating is transferred from the conductive transfer surface to a second transfer surface and thence to the substrate.

54. An apparatus according to claim 33 wherein the substrate comprises a porous substrate.

55. An apparatus according to claim 54 wherein the substrate is coated without substantial penetration of the coating through the substrate.

56. An apparatus according to claim 33 wherein the substrate comprises a woven or nonwoven web.

57. An apparatus according to claim 33 wherein substrate comprises an electronic film, component or precursor thereof.

58. An apparatus according to claim 33 wherein the conductive transfer surface is grounded and substantially none of the charges generated by the electrostatic spraying device are transferred to the substrate.

59. An apparatus according to claim 33 wherein the spray head produces drops having an average drop diameter, the transfer surface transfers a coating having an average

caliper to the substrate, the average caliper is less than the average drop diameter, and the transferred coating is substantially void-free.